IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Before the Board of Patent Appeals and Interferences

In re Patent Application of
SALAMAH et al.
Serial No. 09/742,281
Filed: December 22, 2000

Atty Dkt. 839-892
C# M#
Group Art Unit: 2834
Examiner: Cuevas, P.
Date: May 15, 2003

Title: WAKE REDUCTION STRUCTURE FOR ENHANCING CAVITY FLOW IN GENERATOR ROTOR ENDWINDINGS

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

☐ **Correspondence Address Indication Form Attached.**

☐ **NOTICE OF APPEAL**
Applicant hereby appeals to the Board of Appeals from the decision dated _____ of the Examiner twice/finally rejecting claims _____ ($ 320.00) $

☒ An appeal **BRIEF** is attached in triplicate in the pending appeal of the above-identified application ($ 320.00) $ 320.00

☐ Credit for fees paid in prior appeal without decision on merits -$ ( )

☐ A reply brief is attached in triplicate under Rule 193(b) **(no fee)**

☐ Petition is hereby made to extend the current due date so as to cover the filing date of this paper and attachment(s) **($110.00/1 month**; $410.00/2 months; **$930.00/3 months**; $1450.00/4 months) $

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Any future submission requiring an extension of time is hereby stated to include a petition for such time extension. The Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, in the fee(s) filed, or asserted to be filed, or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our **Account No. 14-1140.** A duplicate copy of this sheet is attached.

1100 North Glebe Road, 8th Floor
Arlington, Virginia 22201-4714
Telephone: (703) 816-4000
Facsimile: (703) 816-4100
MNL:slj

NIXON & VANDERHYE P.C.
By Atty: Michelle N. Lester, Reg. No. 32,331

Signature: _____

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* *

May 15, 2003

Assistant Commissioner for Patents
Washington, DC 20231

APPEAL BRIEF

Sir:

Applicant submits herewith their Brief on Appeal in triplicate as required by 37 CFR §1.192.

1. REAL PARTY IN INTEREST

The real party in interest is the Assignee of record, GENERAL ELECTRIC COMPANY.

2. RELATED APPEALS AND INTERFERENCES

On information and belief, there are no other appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

3. STATUS OF CLAIMS

Claims 1-18 remain pending in this application. Claims 1-18 stand rejected by the Examiner. A copy of the claims that remain pending is attached hereto as Appendix A.

4. STATUS OF AMENDMENTS

No amendments after final have been filed following the Examiner's final rejection of December 12, 2002.

5. SUMMARY OF THE INVENTION

The present invention relates to a method and structure for enhanced cooling of generator rotors and, more specifically, to an improved spaceblock trailing edge contour that reduces generated wake (page 4, lines 17-18). In this regard, a negative effect of spaceblocks is the wake generated by the spaceblock that impacts downstream cavities (page 4, lines 24-25). The invention provides an aerodynamic contour for the trailing edge of at least some spaceblocks to reduce the extent and strength of the generated wake while maintaining the spaceblock's ability to induce cooling flow into the adjacent cavity (page 4, line 25 – page 5, line 1). In one embodiment of the invention, the reduction in wake is achieved by re-shaping the trailing edge of the spaceblock from a conventional rectangular profile to a more streamlined contour.

Thus, the invention is embodied in a rotor having a body portion 14, said rotor having axially extending coils 22 and end turns 27 defining a plurality of endwindings 28 extending axially beyond at least one end 18 of said body portion; and at least one spaceblock 140 located between adjacent said endwindings 28 so as to define a cavity 142 therebetween, said spaceblock 140 having first and second sidewall portions 152,154 engaging said adjacent endwindings 28, an upstream wall 144, and a

downstream wall 146, said downstream wall 146 of said spaceblock having a non-planar contour for reducing generated wake (page 9, line 8 – page 10, line 1).

In an exemplary embodiment, the downstream wall 146 has an aerodynamic contour to reduce the extent and strength of the generated wake. The aerodynamic contour may be provided by a downstream wall 146 defined as a generally parabolic curve (page 10, lines 1-4).

The spaceblock may be formed in one piece or may be comprised of a generally rectangular main body portion 158 and a protrusion portion 156 that defines the downstream wall (page 10, lines 5-8).

6. ISSUES

Whether each of claims 1-18 is patentable under 35 USC 103(a) as not having been obvious from Staub et al (USP 5,644,179) in view of Cole (USP 4,553,722).

7. GROUPING OF CLAIMS

Claims 1-18 each stands or falls alone.

8. ARGUMENT

Typically, spaceblocks are shaped like a block having a planar downstream wall, providing a nominally inefficient interaction with the flow field. In accordance with the invention disclosed and claimed in this application, the spaceblock is modified to have a downstream wall with a non-planar contour for reducing generated wake. In other words, the block is streamlined. Doing so, especially on air-cooled reverse flow generators, minimizes the drag on the block which in turn minimizes the amount of annular momentum added to the annular gap flow. This maintains a higher difference between the annular gap rotational velocity and that of the endwindings, which in turn increases the heat transfer in the endwindings and therefore the cooling effectiveness.

In machines where the endwinding is the thermally limited, the invention would therefore have a significant impact.

Thus, the present invention provides at least one spaceblock located between adjacent rotor endwindings, wherein the downstream wall of the space block has a non-planar contour for reducing generated wake. This reduces the drag of these blocks, particularly where the spaceblock extends radially into the annular space as recited in claims 17 and 18.

Staub shows the conventional parts comprising a generator rotor endwinding, as is also illustrated by way of example in applicant's Figures 1 and 2. As noted by the Examiner, however, Staub does not teach or suggest the concept of providing a downstream wall of a spaceblock that has a non-planar contour for reducing generated wake. The Examiner seeks to overcome this deficiency of Staub by citing the secondary reference to Cole.

Cole's patent describes a mechanism for varying the camber of an airplane wing. In this regard, Cole's invention deals with the leading edge of an airfoil (only) whereas in contrast the claimed invention specifically limits the contour of the downstream wall of a spaceblock. Furthermore, Cole's invention is not a teaching *per se* of providing a non-planar contour but rather relates to a mechanism for variably adjusting the shape of an airfoil.

In order to prove obviousness, a challenger must present prior art references which disclose the claimed subject matter of the patent/application in question. If separate prior art references each disclose separate elements of a claim, the challenger must also show some teaching, suggestion, or incentive in the prior art that would have led one of ordinary skill in the art to make the claimed combination. See, e.g., Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 297 n.24, 304-05 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986). In determining obviousness, there must be

some reason other than hindsight for selectively combining the prior art references to render the claimed invention obvious. See, e.g., Interconnect Planning Corp. v. Feil, 774 F.2d 1132, 1143 (Fed. Cir. 1985).

It is respectfully submitted that in the absence of applicant's disclosure, the skilled artisan would not look to the Cole patent and would not be taught by Cole that any spaceblock of Staub could or should be reconfigured.

Indeed, in the absence of applicant's disclosure, the skilled artisan would not consider any aspect of Cole's patent disclosure to be applicable to a generator much less be motivated thereby to reconfigure the trailing or downstream end of a spaceblock. There would be o reason to do so. Furthermore, it would not apparently be possible to incorporate an operative camber varying mechanism as taught by Cole in a spaceblock, because the coils would prevent its operation. Cole does not otherwise teach or suggest that the downstream or trailing edge of the spaceblock of Staub could or should be modified in any respect.

The Examiner bears the burden of establishing the existence of either 1) some objective teaching in the prior art or 2) knowledge generally available to one of ordinary skill in the art which would lead that individual to change the primary reference. In re Jones, 21 USPQ2d 1941, 1943-44 (Fed. Cir. 1992). Section 103 does not allow the Examiner to engage in picking and choosing from the prior art only to the extent that it will support a holding of obviousness, while excluding parts of the prior art essential to the full appreciation of what the prior art suggests to one of ordinary skill in the art. In re Wesslau, 147 USPQ 391 (CCPA 1975). As the CAFC has said, obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. ACS Hospital Systems v Montefiore Hospital, 221 USPQ 929, 933 (Fed. Cir. 1984). There must be a suggestion in the art relied upon to use what one reference discloses

in or in combination with the disclosure of the other reference or references relied upon by the Examiner. In re Grabiak, 226 USPQ 870, 872 (Fed. Cir. 1986).

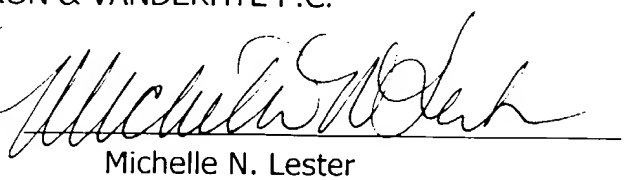
While it is recognized that streamlined shapes *per se* are known and have been adopted in a variety of systems and devices, that fact does not *ipso facto* mean that it would be "obvious" to modify the configuration of the Staub spaceblock to have a wake reducing contour. Applicant's invention on the contrary stems from knowledge and appreciation of the functionality of the spaceblocks (which prevents arbitrary shape modifications), the disposition of the flow field, and the effect the spaceblocks have on the flow field and ultimately on the performance of the generator. The Examiner has cited no evidence whatsoever that anyone before applicant even contemplated configuring a downstream wall of a spaceblock to control wake or any other characteristics of the flow into the cavity downstream thereof. Indeed, as noted above, the secondary reference to Cole is, frankly, irrelevant to the assembly taught by Staub and does not motivate the skilled artisan to modify Staub. Moreover, even if Cole were combined with Staub, the result would be a reconfigured upstream wall, not a contoured downstream wall as claimed. It is therefore respectfully submitted that applicant's concept for achieving increased heat transfer and therefore cooling effectiveness is not anticipated by nor obvious from the prior art of record.

CONCLUSION

For all the reasons advanced above, it is respectfully requested that the Examiner be reversed, that this appeal be granted, and that all claims 1-18 be allowed.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: 

Michelle N. Lester
Reg. No. 32,331

MNL:slj
1100 North Glebe Road, 8th Floor
Arlington, VA 22201-4714
Telephone: (703) 816-4000
Facsimile: (703) 816-4100

APPENDIX A

9. CLAIMS ON APPEAL

1. A gas cooled dynamoelectric machine, comprising:

a rotor having a body portion, said rotor having axially extending coils and end turns defining a plurality of endwindings extending axially beyond at least one end of said body portion; and

at least one spaceblock located between adjacent said endwindings so as to define a cavity therebetween, said spaceblock having first and second sidewall portions engaging said adjacent endwindings, an upstream wall, and a downstream wall, said downstream wall of said spaceblock having a non-planar contour for reducing generated wake.

2. The dynamoelectric machine of claim 1, wherein said downstream wall has an aerodynamic contour to reduce the extent and strength of the generated wake.

3. The dynamoelectric machine of claim 2, wherein said downstream wall is defined as a generally parabolic curve.

4. The dynamoelectric machine of claim 1, wherein said upstream wall is generally planar.

5. The dynamoelectric machine of claim 1, wherein said spaceblock is comprised of a generally rectangular main body portion and a protrusion portion, said main body portion defining said upstream wall and said sidewall portions, and said protrusion portion defining said downstream wall.

6. The dynamoelectric machine of claim 5, wherein said downstream wall is defined as a generally parabolic curve.

7. The dynamoelectric machine of claim 5, wherein said upstream wall is generally planar.

8. The dynamoelectric machine of claim 5, wherein said protrusion portion is integrally formed with said main body portion.

9. A gas cooled dynamoelectric machine, comprising:

a rotor having a spindle and a body portion;

a rotor winding comprising axially extending coils disposed on said body portion and spaced, concentric endwindings extending axially beyond at least one end of said body portion, said endwindings and said spindle defining an annular space therebetween;

a plurality of spaceblocks located between adjacent ones of said endwindings thereby to define a plurality of cavities, each bounded by adjacent spaceblocks and adjacent endwindings and open to said annular space; and

each said spaceblock having first and second sidewall portions engaging said adjacent endwindings, an upstream wall, and a downstream wall, said downstream wall of at least one of said spaceblocks having a non-planar contour for reducing generated wake.

10. The dynamoelectric machine of claim 9, wherein said non-planar downstream wall has an aerodynamic contour to reduce the extent and strength of the generated wake.

11. The dynamoelectric machine of claim 10, wherein said non-planar downstream wall is defined as a generally parabolic curve.

12. The dynamoelectric machine of claim 9, wherein said upstream wall of each said spaceblock is generally planar.

13. The dynamoelectric machine of claim 1, wherein said at least one spaceblock is comprised of a generally rectangular main body portion and a protrusion portion, said main body portion defining said upstream wall and said sidewall portions, and said protrusion portion defining said non-planar downstream wall.

14. The dynamoelectric machine of claim 13, wherein said downstream wall is defined as a generally parabolic curve.

15. The dynamoelectric machine of claim 13, wherein said upstream wall is generally planar.

16. The dynamoelectric machine of claim 13, wherein said protrusion portion is integrally formed with said main body portion.

17. The dynamoelectric machine of claim 1, further comprising a rotor spindle extending axially beyond said at least one end of said body portion and defining an annular space with said endwindings, and wherein said at least one spaceblock extends radially into said annular space.

18. The dynamoelectric machine of claim 9, wherein said plurality of spaceblocks extend radially into said annular space.